

## PETAPHYS collaborative project and PETAL

### Workshop on laser-driven Electromagnetic pulses

Bordeaux, March 11, 2016, 9h30 – 17h, IMB conference hall, A33

Organizers: CELIA – D Batani and V Tikhonchuk

#### Abstract:

High-energy high-intensity lasers are an emerging tool in physics which allows novel studies in particle acceleration, warm dense matter, nuclear physics with lasers, etc. Europe is leading in this field of science with new laser systems just completed or under construction: PETAL and Apollon in France, ELI in Hungary, Romania, the Czech Republic, VEGA in Spain, etc.

When such intense laser pulses are focused on targets, very high amplitude EMP (electromagnetic pulses) are generated with fields that, in the case of a later system like PETAL, are expected to reach 1 MV/m in vicinity of the target. Such huge electric and magnetic fields pose very serious problems with respect to the correct laser operation, and even the survival, of diagnostics based on electronics.

The questions of EMP generation and protection are becoming timely and urgent since many of the cited laser systems are expected to begin operation in a very short time. The goal of this workshop is to collect and compare experimental data obtained in several laser facilities and to develop a common approach to the mitigation of EMP hazards. We will discuss the progress in experiments, developing theoretical models and numerical simulations allowing to reproduce the existing data and extrapolating them to higher energies. Finally, we would like to develop tools permitting to mitigate either the impact or the generation of EMP.

These are the reasons for this 1-day workshop in Bordeaux with the participation of scientists from various European laboratories (CELIA, CESTA, Saclay, Rutherford Appleton Laboratory, Orion, CLPU Salamanca, ELI)

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## **PROGRAMME OF THE DAY**

9.30 – welcome and introduction – Dimitri Batani

9.35 – 11.00 – First session, chair Dimitri Batani

Alexandre Poye, Univ. Lyon, France

Giant ElectroMagnetic Pulse generation in short pulse laser experiments

Piotr Raczka, IPPLM, Warsaw, Poland

Methods of analysis of the EMP signal observed at high intensity laser facilities

Fabrizio Consoli, ENEA Frascati, Italy

Dielectric and conductive probe measurements and related modeling of EMPs in the ns ABC laser

11.00 – 11.15 coffe break

11.15 – 12.45 – Second session, chair K.Jakubowska

Massimo De Marco, ELI, Prague, Czech Republic

Electromagnetic pulses generated with high power laser pulses

Kwinten Nelissen, ELI-alps, Szeged, Hungary

Preliminary EMP estimates and mitigation strategies at ELI-ALPS

Josef Krasa, PALS, Prague, Czech Republic

Experiments devoted to return currents driven by ns lasers, and basic characteristics of EMP at PALS.

Roland Smith, Imperial College, London, UK

Reducing EMP using optically levitated targets

12.45 – 13.15 Discussion led by David Neely & Arie Zigler

13.15 – 14.15 lunch

14.15 – 15.45 – Third session, chair Luca Volpe

Arie Zigler, Univ. Jerusalem, Israel

Temporal evolution of charge particle emission during interaction of intense laser with solid targets

David Carrol, RAL UK

EMP studies on the Vulcan laser: time and frequency data

Jean Luc Dubois, CELIA, Bordeaux

PETAL: overview of EMP generation

15.45 –17.00 – discussion led by Roland Smith & Vladimir Thikhonchuk and conclusions